

ARCHITECTURAL DESIGN SERVICE



A.I.A. FILE NO. 35-A-2

ROOM DESIGN GUIDELINES FOR VISUAL COMMUNICATIONS
A SERVICE FOR ARCHITECTS, DESIGNERS, BUSINESSMEN AND EDUCATORS

WHAT IS AN OVERHEAD PROJECTOR?

- A simple, easy-to-use communication aid that can be used from the front of a fully lighted room.
- The speaker faces the audience at all times while the projected picture is shown on a screen a few feet away.
- The speaker can call attention to specific items being projected by using a marking pencil or pointer on the stage of the projector. The speaker can see on the stage the same information that is being viewed by the audience on the screen.
- The transparencies used on the stage of the projector can be made from printed or written material in a few seconds time using a 3M Brand Transparency Maker and Copier or a THERMO-FAX Copying Machine.



The overhead projector is rapidly becoming a major communications aid in instructional situations. This trend is of great importance in considering new school and meeting room design. Many schools have set an objective of one overhead projector in every classroom. This means that these projectors will be used as an everyday teaching tool. It also means the projectors will be left in the classroom permanently.

Businessmen are also adopting the overhead projectors for use in their conference rooms because of its many advantages over more traditional visual communications methods.

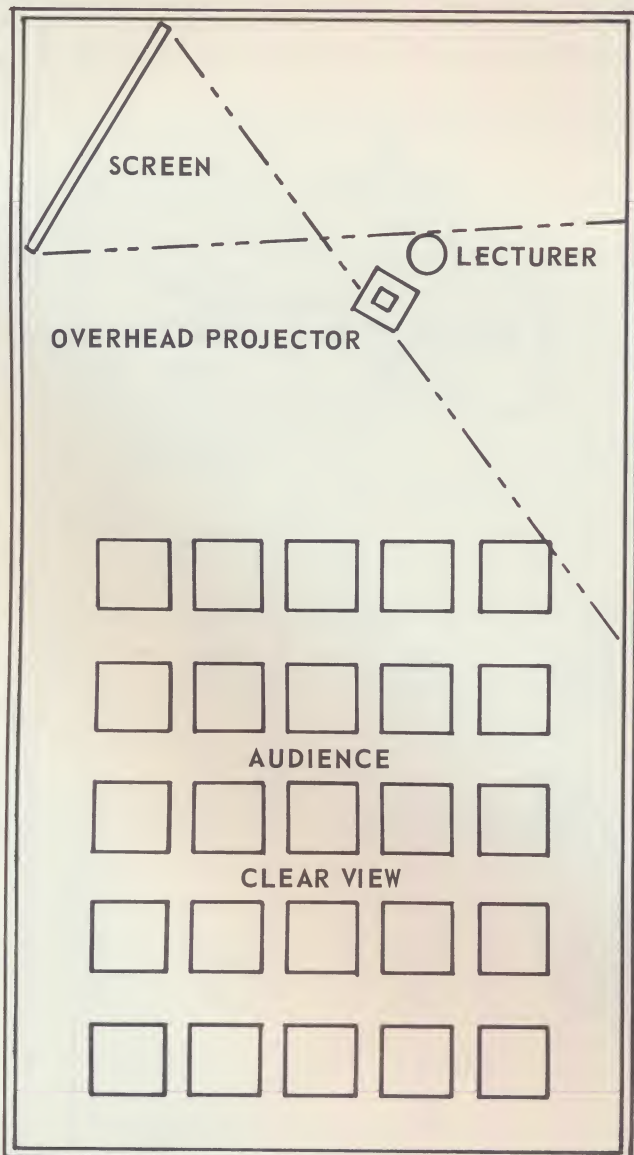
Because there is a best room arrangement for effective utilization of the overhead projector, this booklet is made available as a guide to anyone concerned with design for communication.

16 GUIDELINES

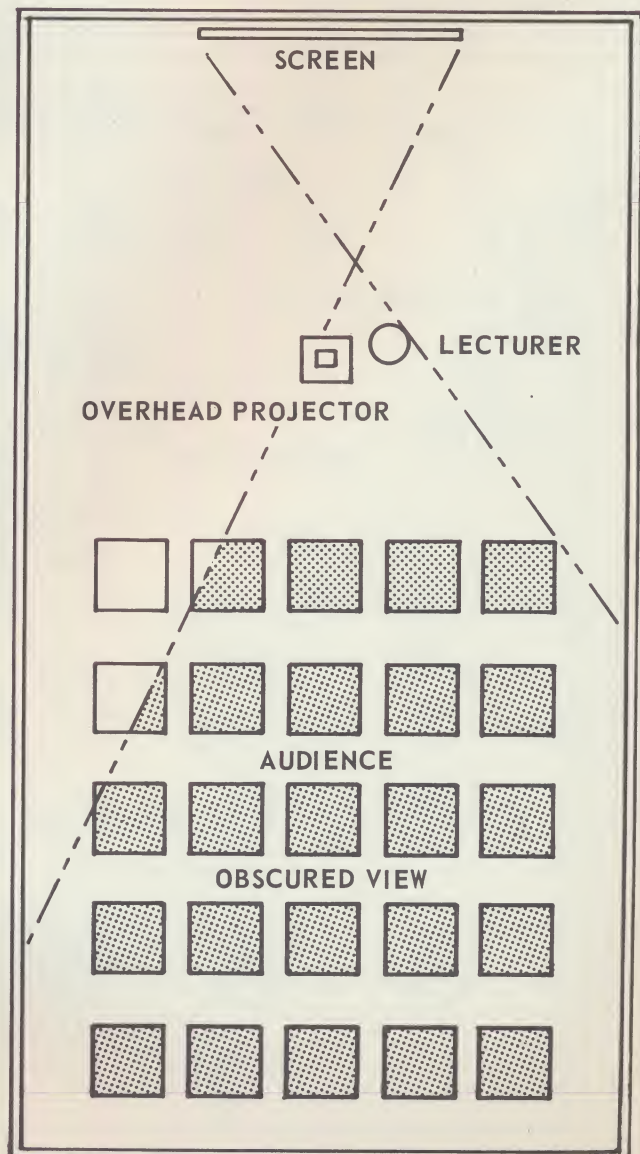
SCREEN PLACEMENT

- 1 The screen must always be placed in the corner of the room to allow clear viewing by all students. The instructor and projector will otherwise obstruct the view of some of the audience.

BEST SCREEN - PROJECTOR ARRANGEMENT

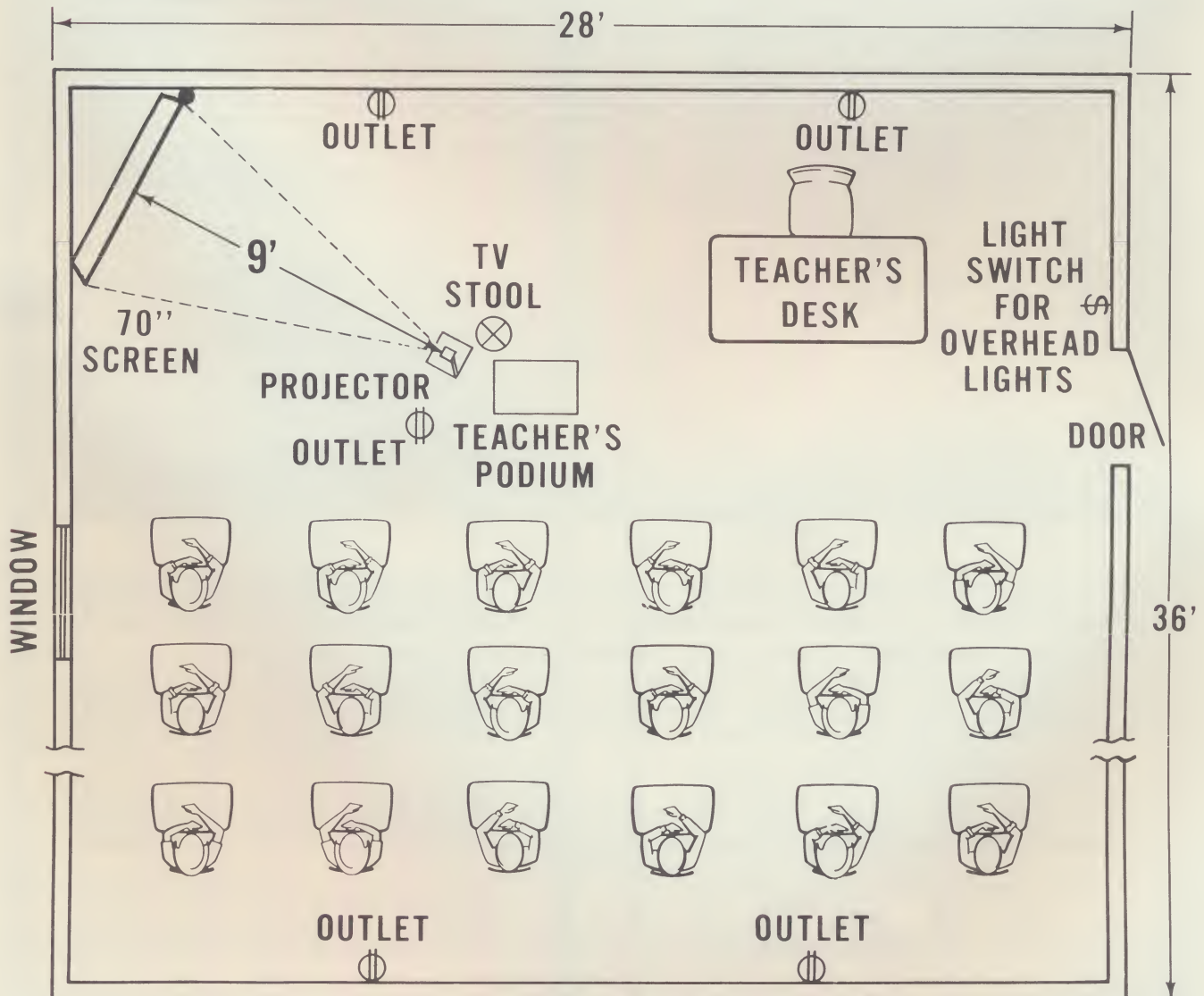


POOR SCREEN - PROJECTOR ARRANGEMENT

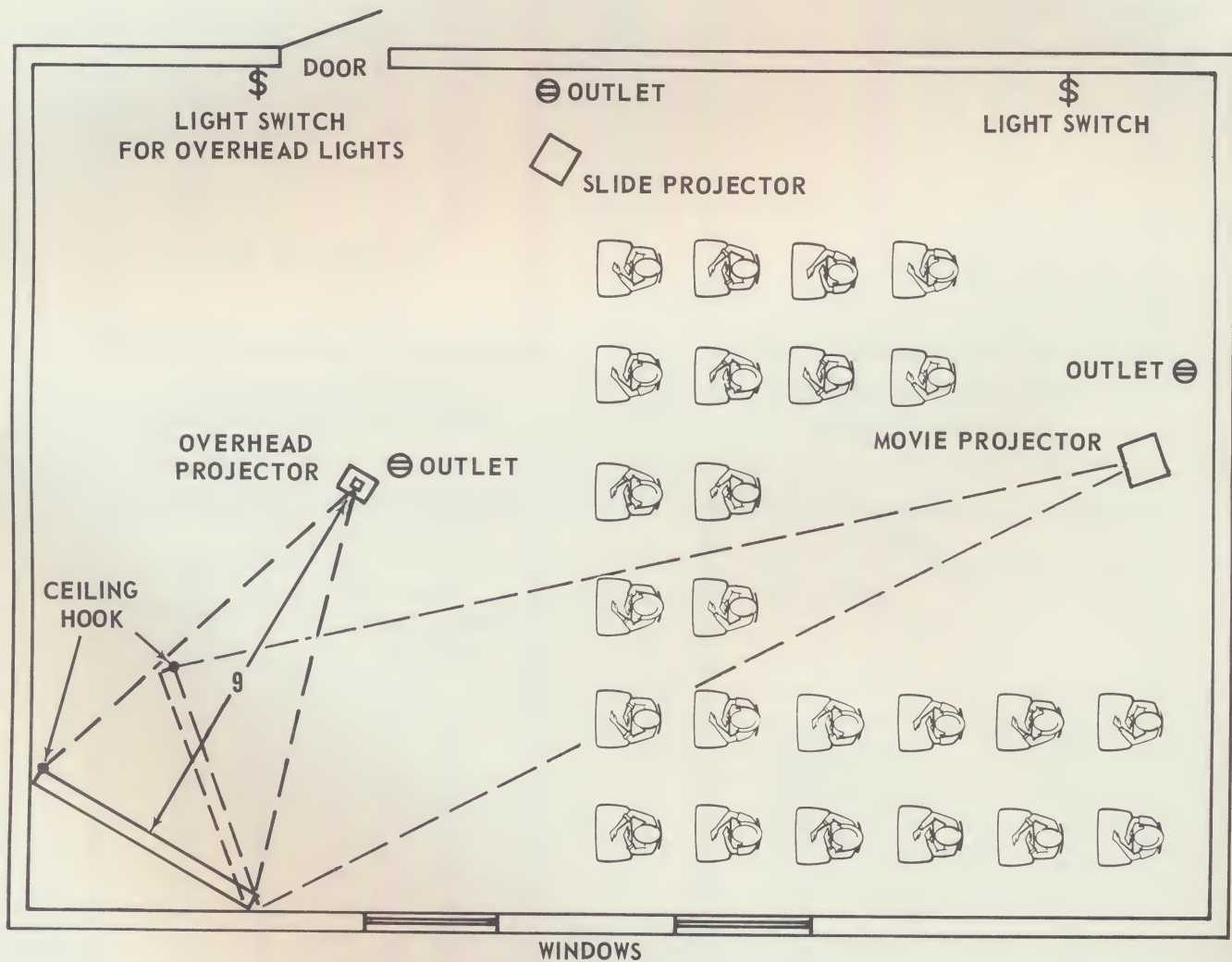


TYPICAL CLASSROOM ARRANGEMENT

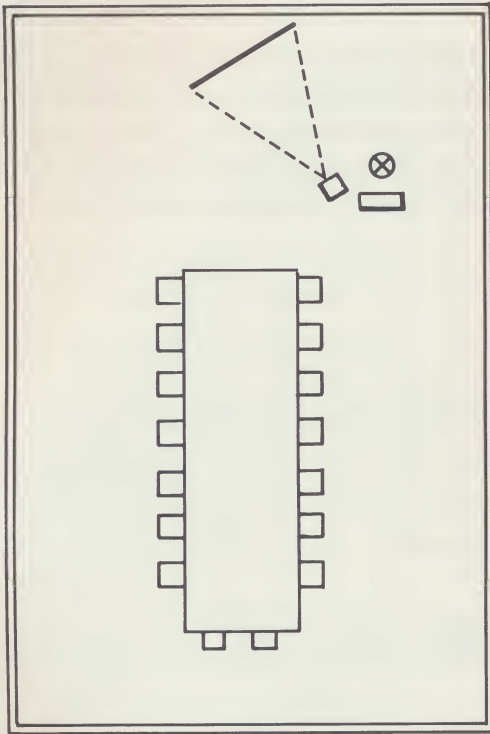
- 2 The screen is placed in the corner to the right of the instructor as he faces the class (for right-handed instructors). This allows the instructor to write on the stage of the projector while facing the class.
- 3 Projection screens should not cover an entrance. Doors should be planned so they will not interfere with the best projection screen location.
- 4 Two 15 ampere electrical outlets should be provided at the teaching end of the room to accommodate the projection equipment. One 15 ampere electrical outlet should be located on each of the remaining three sides of the room for other needs. If possible, a floor outlet should be located at the projector location to eliminate the danger of tripping over the power cord.
- 5 Overhead lights directly over the projection screen should be avoided or controlled by a separate switch.
- 6 To minimize waste space, instruction should take place from the narrow end of the room rather than the wide side. The first row of students is positioned immediately past the overhead projector. Since the projector must extend somewhat into the room, the space wasted across the smaller dimension of the room is less than were the projector located adjacent to the longer wall.



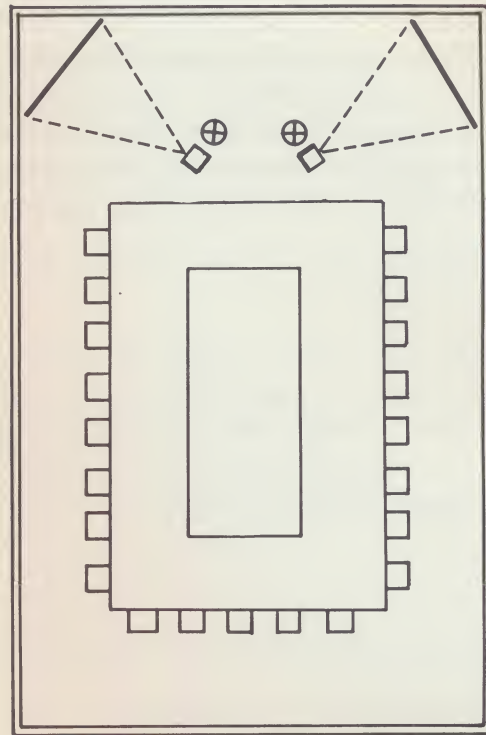
- 7 Because of bright sunlight, students should not face east, west or south windows. Therefore, the screen must be located to provide proper student orientation.
- 8 Avoid windows near the teaching end of the classroom. Children should not look directly into bright light when viewing the screen nor should excessive light on the screen compete with the overhead projector light.
- 9 Slide projectors and film strip projectors can be used in the classrooms described without changing the screen position or angle. Locate these projectors about twice the distance from the screen as the overhead, and temporarily remove the overhead projector so it does not block the line of projection. The use of movie projectors will require screen rotation.



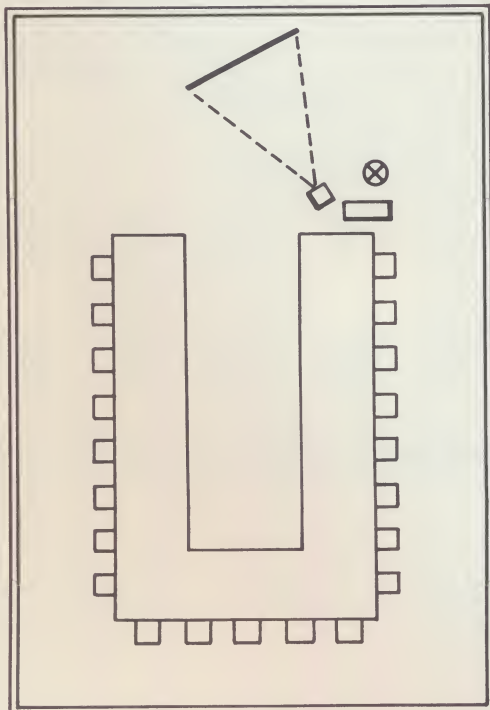
TYPICAL MEETING ROOM ARRANGEMENTS



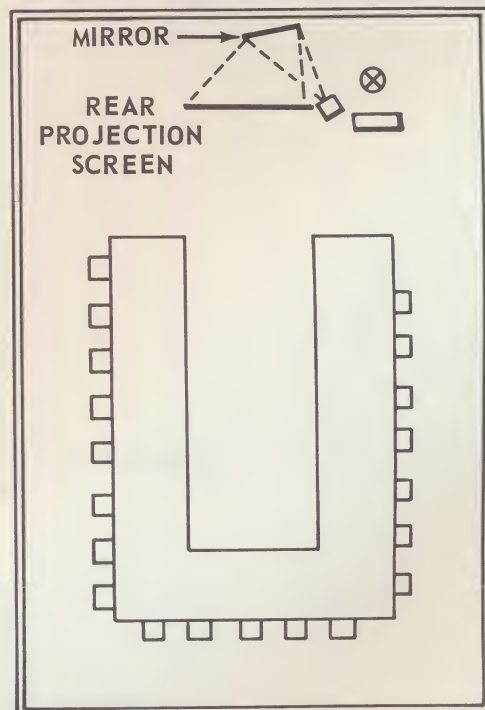
CENTER ARRANGEMENT
FOR SMALL GROUPS



STEREO ARRANGEMENT
FOR SALES SPECTACULARS



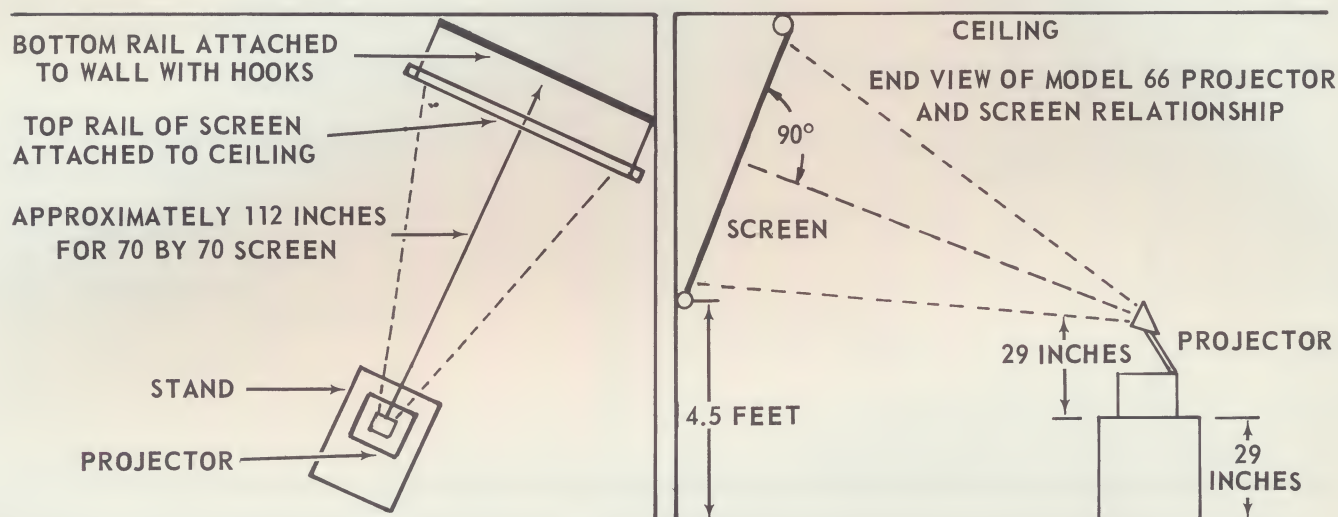
CENTER ARRANGEMENT



REAR VIEW PROJECTION ARRANGEMENT

SCREEN POSITIONING TO PREVENT KEYSTONING

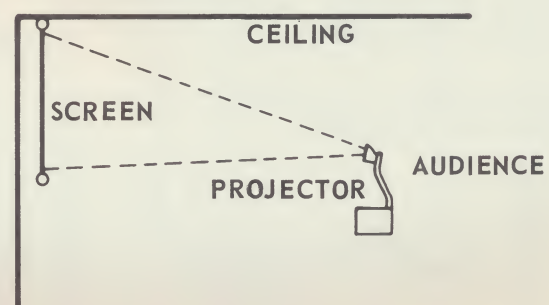
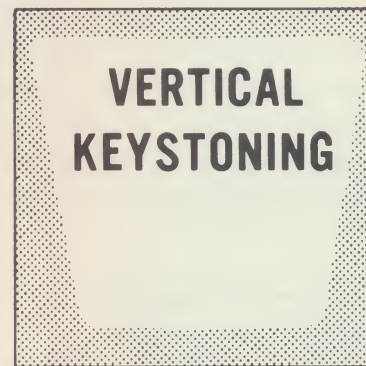
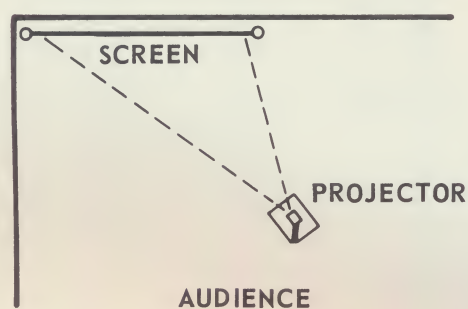
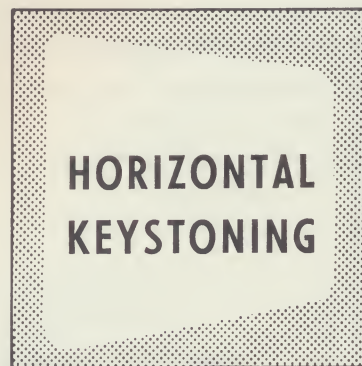
- 10 The screen should be permanently mounted and remain in projection position. Screens can extend from the walls far enough to allow anti-keystoning tilt.
- 11 The screens must be tilted forward at the top (or back at the bottom) to prevent image keystoneing. The amount of tilt is determined by assuming the top of the screen to be a certain height above floor level and the projector head to be 58 inches above floor level. As an example, a 60 by 60 inch screen requires 12-1/2 inches of forward tilt under these circumstances when the ceiling height is nine feet.



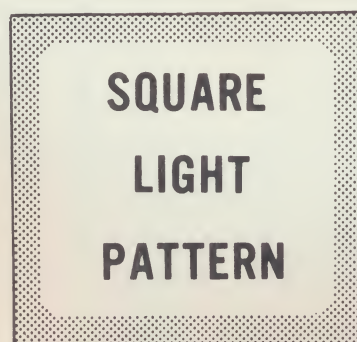
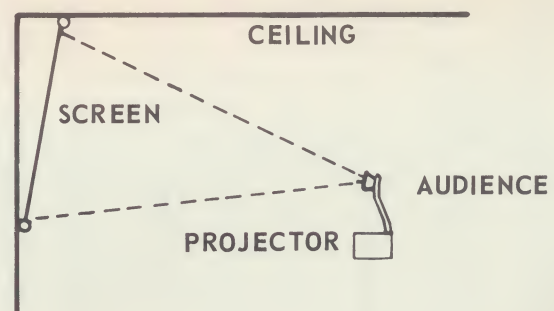
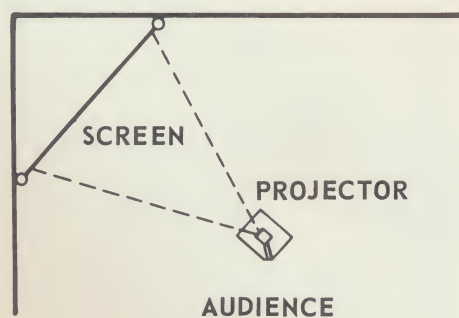
Attach the top of your screen to the ceiling and out from the wall the number of inches indicated in Column A, B, C, D, E, F or G.

CEILING HEIGHT (FEET)	SCREEN SIZE (INCHES)							
	A 50 x 50	B 60 x 60	C 70 x 70	D 84 x 84	E 96 x 96	F 108 x 108	G 120 x 120	
8	8	5	2	TOO LOW				
9	15	12-1/2	10					6
10	24	20-1/2	17-1/2					14
11	33	30	26	21-3/4	18-3/4	14-1/4	TOO MUCH ANGLE	
12	TOO MUCH ANGLE		34-1/2	30	27	22-1/2		19-1/2
13			TOO MUCH ANGLE			36		31-1/2
14	TOO MUCH ANGLE						34-3/4	

INCORRECT SCREEN ANGLES WHICH PRODUCE HORIZONTAL AND VERTICAL KEYSTONING



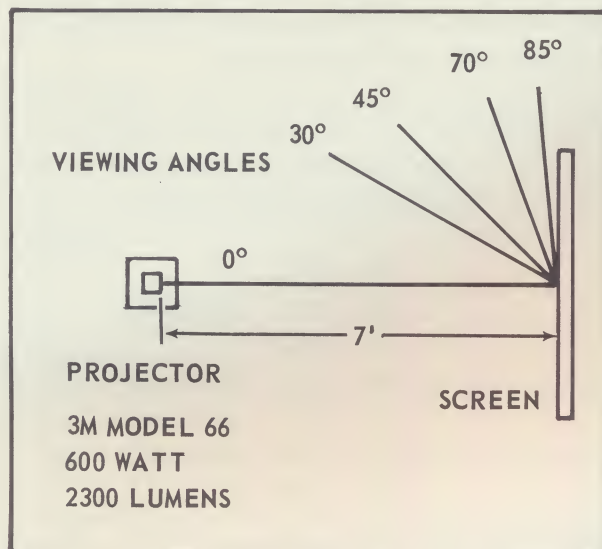
CORRECT SCREEN ANGLES WHICH PRODUCE A SQUARE LIGHT PATTERN ON THE SCREEN



SCREEN ILLUMINATION VS. VIEWING ANGLE

- 12 Matte finish screens must be used in classrooms because of the sharp angles at which students view the screen. Our tests show that students have no problem viewing images from matte finish screens at angles down to 75 degrees. Beaded or lenticular screens will not work at these sharp angles.

IMAGE ILLUMINATION AT VARIOUS VIEWING ANGLES FOR THREE DIFFERENT SCREEN SURFACES



VIEWING ANGLE FROM PERPENDICULAR TO SCREEN	0°	30°	45°	70°	85°
MATTE SCREEN	*32	32	26	21	8
LENTICULAR SCREEN	*36	25	21	10	4
BEADED SCREEN	*61	39	20	11	4

IMAGE ILLUMINATION AT VARIABLE ANGLES FROM PROJECTION SCREEN

* READINGS ARE IN CANDLE POWER MEASURED FROM 3 FEET

PROJECTOR TO SCREEN DISTANCES

Standard overhead projectors are manufactured with a 14-inch focal length projection lens. The standard overhead projectors include the 3M Brand Model 66, Model 60 and Model 42.

Projector to screen distance depends upon screen size: the greater distance, the larger the screen required.

STANDARD OVERHEAD PROJECTORS 14-INCH FOCAL LENGTH		MODEL 88 DESKTOP PROJECTOR 10.5 INCH FOCAL LENGTH	
DISTANCE PROJECTOR TO SCREEN	USE SCREEN SIZE (INCHES)	DISTANCE PROJECTOR TO SCREEN	USE SCREEN SIZE (INCHES)
84 inches (7 ft.)	50 x 50	63 inches (5 ft. 3 in.)	50 x 50
98 inches (8 ft. 2 in.)	60 x 60	73 inches (6 ft. 1 in.)	60 x 60
112 inches (9 ft. 4 in.)	70 x 70	84 inches (7 ft.)	70 x 70
131 inches (10 ft. 11 in.)	84 x 84	99 inches (8 ft. 3 in.)	84 x 84
148 inches (12 ft. 4 in.)	96 x 96	111 inches (9 ft. 3 in.)	96 x 96
165 inches (13 ft. 9 in.)	108 x 108		
182 inches (15 ft. 2 in.)	120 x 120		

- 13** The size of projection screen required for a specific application is dependent on two factors: the size of the classroom and the distance of the screen from the most remote student. The screen size chart presented below has been developed by the 3M Company especially to establish screen size requirements.

SCREEN SIZE

Screen size must be equated to the distance between the screen and the person sitting farthest from the screen. Screen size dictates the magnification possible from the projector to the screen.

MAXIMUM DISTANCE STUDENT TO SCREEN (FEET)	SCREEN SIZE REQUIRED (INCHES)
20	50 x 50
25	60 x 60 (5 feet)
30	70 x 70
35	84 x 84 (7 feet)
40	96 x 96 (8 feet)
45	108 x 108 (9 feet)
50	120 x 120 (10 feet)

- 14** For making transparencies, a 3M Brand Model 96 Transparency Maker-Copier or a THERMO-FAX Brand Model 45 "Secretary" Copying Machine is recommended for every four overhead projectors in a school. A 3M Brand Model 70 Transparency Maker-Copier is recommended for every ten overhead projectors.
- 15** In a classroom having an overhead projector and screen built in, the chalkboard requirements can be reduced. Experience has shown that 80 square feet of chalkboard space is sufficient in a classroom where the overhead projector is used daily as a teaching tool.
- 16** Avoid low ceilings in very large classrooms. As distances between student and screen increase, the projection screen size must increase. Low ceilings limit screen size and therefore projector usefulness. Ceiling height requirements for various front-to-rear of room distances are as follows:

DISTANCE (FRONT-TO-REAR) (FEET)	CEILING HEIGHT (FEET)
0-30	9
30-40	10
40-50	11
50-60	12
Over 60	Over 12

THE 3M ARCHITECTURAL DESIGN SERVICE was created to aid architects, designers, School Administrators and businessmen in the design of classroom and meeting rooms for more effective visual communications.

Primary emphasis is placed on the effective utilization of overhead projectors in everyday classroom and meeting room situations. Included in this brochure are 16 guidelines to proper room design and arrangement for use of audio visual equipment. Some of the information covered in these 16 guidelines is listed below.

- Size and type screen required for a particular room size.
- Distance from screen to projector and audience for varying screen sizes.
- Room arrangement (i.e., screen location, projector location and transparency maker location).
- Light switch and 110-volt outlet recommendations.
- Tilt of screen to prevent vertical and horizontal keystoneing.
- Distance required between front row of student seating and front wall for proper operation of projector.
- Recommended ceiling height to accommodate screens required.
- Recommended shape of classrooms.

FOR MORE INFORMATION OR CONSULTATION, WRITE OR SEND PLANS TO:

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Visual Products Division

